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Asymmetry in Maritime Access and Undersea Anti-Access/Area-Denial Strategies

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PREFACE

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13. ABSTRACT (Maximum 200 words)

Much of the recent national discussions about asymmetric warfare and asymmetric threats has been lacking a rigorous understanding of the dimensions of asymmetry in warfare. Because opponents in warfare are always looking for an asymmetric advantage against their adversary, the term "asymmetric warfare" fails to have a useful meaning. Warfare asymmetry discussions understandably address the War on Terror and U.S. homeland defense, with the focus on nonstate, nontraditional threats. From a national security perspective, however, it is equally important to address asymmetric approaches plausibly employed by potential adversaries during conventional campaigns that will most likely be of a limited-objective nature. This report examines the nature of asymmetry in a conventional campaign from a maritime perspective and, in particular, that which might constitute an asymmetric threat from under the sea. Exploitation of the maritime undersea environment presents unique options for inferior force anti-access/area-denial capabilities, necessitating unique superior force access options. Military strategists and planners must further examine the risk that these asymmetries pose and must examine the use of U.S. asymmetric strengths. It is expected that, when the maritime challenge of limited-objective conventional campaigns is examined from an asymmetric and inferior force perspective, U.S. strategy, tactics, applied technology, and military investments will need adjustment to reduce the uncertainty of the risk posed by asymmetric threats and to increase U.S. preparedness.

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LIST OF ABBREVIATIONS AND ACRONYMS

A2	Anti-access
A2/AD	Anti-access/area denial
AD	Area denial
ASW	Antisubmarine warfare
CONOPS	Concept of operations
DoD	Department of Defense
EMP	Electromagnetic pulse
IED	Improvised explosive device
NBC	Nuclear, biological, and chemical
PLA	People's Liberation Army
QDR	Quadrennial Defense Review
SLOC	Sea lines of communication
USW	Undersea warfare

ASYMMETRY IN MARITIME ACCESS AND UNDERSEA ANTI-ACCESS/AREA-DENIAL STRATEGIES

1. INTRODUCTION

The use of asymmetric ways and means in warfare by inferior military forces is not a new concept. Records show that George Washington[1] alluded to it in his 1776 letter to the Continental Congress and, in a 1938 lecture series, Mao Zedong[2] clearly demonstrated his grasp of the subject:

> . . . on our Side the War should be defensive. . . . That we should on all Occasions avoid a general Action, or put anything to the Risque, unless compelled by a necessity, into which we should never be drawn.[1]

> Without preparedness, superiority is not real and there can be no initiative, either. Knowing this, an inferior force which is prepared can often spring surprise attacks and defeat a superior force.[2]

Events in recent history, however, have prompted military planners to revisit the concept of asymmetry in warfare. Researchers have focused on why, in recent history dominated by limited warfare, strong powers (state or non-state forces) have more frequently lost to weak powers.[3,4] Ivan Arreguín-Toft[4] has shown that the percentage of conflict victories by strong powers over weak powers has drastically decreased since 1800: from 88.2% for the years 1800 – 1849 to 45% for the years 1950 – 1998. In general, when one thinks about losses by the stronger power, the images that come to mind are those where the weak power has used a Fabian-like strategy of indirect defensive approaches (for example, avoid direct engagement, skirmish, harassment, and protraction) against the strong power's direct offensive approach. Examples include the loss suffered by the strong British power in the American War of Independence and the loss suffered by the strong United States of America in the Vietnam Conflict in the 1960s and 1970s. When the strong and weak powers have used different approaches (direct versus indirect*), the weak power has won 63% of the time from 1800 – 1998.[4] When both powers have used the same approach (direct versus direct or indirect versus indirect), the strong power has won 76% of the time.[4] These compelling statistics suggest that a comprehensive study of asymmetry and the implications it has for a strong power such as the United States be conducted.

The concept of asymmetry in the context of current asymmetric warfare and asymmetric threats is not straightforward. The 2006 Quadrennial Defense Review (QDR) presents a taxonomy of U.S. national security missions, where the national security needs must address conventional campaigns, war on terror/irregular warfare, and homeland defense.[5] The QDR addresses the adversary's use of asymmetric warfare only in the context of the war on terror/irregular warfare and homeland defense. Arreguín-Toft's research,[4] however, suggests that the United States must carefully consider how asymmetric warfare could be employed in

* For this context, "direct" refers to the use of trained and equipped regular forces; "indirect" refers to the use of irregular forces.

conventional campaigns as well. Much has been written about strategies and counterstrategies for asymmetric warfare in the context of the war on terror/and the conflicts in Iraq and Afghanistan, but there has been very little research on asymmetry applied to conventional campaigns. An exception to this generalization is the work of Roger Barnett, who offers the thesis that the operational, organizational, legal, and moral constraints on the use of U.S. armed forces stimulate asymmetrical acts by the adversary.[6]

Similarly, T.V. Paul[7] has shown "that a weaker power can engage in war initiation, knowing very well that it may lose the war militarily but may gain politically. Thus, on the eve of war, a weaker power may hold the well-known axiom: 'One may lose the battle but not the war'."[7] The familiar logic of "balance of power" has limits suggesting that limited-objective conventional campaigns are likely regardless of U.S. military superiority.

Given the importance of strategy to military posture, risk, and adverse response, additional exploration of the implications of asymmetric warfare to U.S. warfighting strategies is warranted. Further, in light of the 21st century trend by the U.S. toward a new joint expeditionary posture,[8] relating lessons of asymmetric land warfare with asymmetric maritime warfare can yield insights to anti-access strategies and counterstrategies in naval warfare—a specific topic explored in this report.

The maritime environment presents its own unique challenges to conventional campaign strategists and tacticians concerned about asymmetry. In the post-Cold War era of limited wars, there are plausible reasons why maritime conflicts may not result in a mighty clash of naval forces and might, instead, develop into scenarios of limited engagements (for example, the Falklands War) made more complex by the contributions of noncombatants to an adversary's situational awareness, by cluttering of the battlespace, and by the potential to become collateral damage. Enabled by technology, the undersea domain of the maritime environment provides unique opportunities for asymmetry in the form of concealment and sanctuary for undersea-based warfighting capabilities.

Asymmetric warfare and asymmetric threats are popular subjects in contemporary military literature; the terms, however, are handled inconsistently and indiscriminately.[9] Most discussions of asymmetry and weak powers focus on armed forces on land; few studies focus on the maritime battlespace. This technical report, however, demonstrates that the maritime environment—especially the undersea domain—has unique attributes worthy of exploration in asymmetric warfare. This report presents a comprehensive discussion of the principles of asymmetric warfare and their implications for undersea warfare, as well as a discussion of asymmetry in maritime access and undersea anti-access/area denial strategies. Some of the questions this report seeks to answer are: (1) what are the principles of asymmetry in undersea warfare and what strategies could be employed by inferior forces based on these principles; (2) what strategies emerge to counter the anti-access/area-denial tactics likely to be employed by inferior force strategies; and (3) what are the implications of the answers to the questions (1) and (2) for naval warfare and national naval posture in the 21st century?

2. PRINCIPLES OF ASYMMETRIC WARFARE

For the last decade, Department of Defense (DoD) personnel and Defense analysts have exhibited an increased interest in the problems of asymmetric threats and asymmetric warfare. From operational and strategic perspectives, the terms connote some combination of the following factors:

1. disproportionate capabilities between adversaries,

2. unconventional approaches toward weakening the adversary, and

3. disproportionate loss to one side based on factor 1 and/or factor 2.

The perceptions are that asymmetry is something used by an adversary who is not fighting fair, is attacking a weak point, is conducting cyber war, is waging a public relations war, or is seeking to use weapons of mass destruction.[10] These explanations are less than satisfying for a fundamental understanding of the topic.

2.1 ASYMMETRIC THREATS

The term "asymmetric threat" has been used to describe technologies or capabilities with the potential to provide disproportionate damage. Submarines and mines are often cited as examples of this definition because of the asymmetry of the potential damage a submarine-delivered torpedo or missile can inflict on a highly valued surface warship. A counterperspective offered by others is that, if both sides have submarines and mines, they become symmetric threats. So, a compelling question is: What really is the difference between asymmetrical and symmetrical threats?

Stephen J. Blank cautions not to concentrate on the concept of an asymmetric threat as a weapon system at the strategic level:

> . . . continuing to use that concept or the related notion of "asymmetry" with regard to threat assessment (not strategy) impedes clear thinking and sound strategic planning thereby complicating our commanders' and leaders' jobs. . . . Instead, we should return to classifying threats flowing from asymmetric enemies and their equally asymmetric strategies or war plans on the basis of their scope and magnitude, or to their effect upon us.[9]

C. A. Primmerman addresses this problem and offers a more complete operational definition:

> An asymmetric threat must satisfy the following three criteria.
>
> *First, it must involve a weapon, tactic, or strategy that a state or non-state enemy both could and would use against the United States. . . .*

> *Second, it must involve a weapon, tactic, or strategy that the United States would not employ. . . .* A corollary to the second criterion states that *the threat involves a weapon, tactic, or strategy that the United States would not combat by retaliating in kind and, therefore, could not deter by threatening to retaliate in kind.*
>
> *Third, it must involve a weapon, tactic, or strategy that, if not countered, could have serious consequences. . . .* A corollary to the third criterion states that *the threat involves a weapon, tactic, or strategy that is not already countered by systems designed to deal with symmetric threats."*[11]

For example, if Primmerman's criteria are applied to undersea threats, one would argue that the issue is not whether an adversary has a submarine, but rather what submarine tactics the adversary might use with serious consequences that the United States would not use. Thus, the military planner, while concentrating on the adversary's military weapons, should be careful not to miss the true threat of asymmetry.

2.2 ASYMMETRY IN WARFARE

The distinction between the threat and the means to threaten alluded to in section 2.1 leads to a discussion of asymmetry in warfare. Official DoD definitions of asymmetry and asymmetric warfare do not exist in Joint Publication 1-02[12]; therefore, it appears that the terms are best explained by what they characterize—similar to DoD handling of network-centric warfare. In this vein, Steven Metz,[13] in an article on strategic asymmetry, offers that "[s]trategic asymmetry uses some sort of difference to gain an advantage over an adversary." He further states that:

> A more general, complete definition of strategic asymmetry would be: In military affairs and national security, *asymmetry is acting, organizing and thinking differently from opponents to maximize relative strengths, exploit opponents' weaknesses or gain greater freedom of action.* It can be political-strategic, military-strategic, operational or a combination, and entail different methods, technologies, values, organizations or time perspectives. It can be short-term, long-term, deliberate or by default. It also can be discrete or pursued in conjunction with symmetric approaches and have both psychological and physical dimensions.[13] [Emphasis added.]

In a 2001 report, Metz and Douglas V. Johnson expound on the concept of asymmetry and provide the dimensions and forms of asymmetry relevant to national security and warfare. Adversaries can have asymmetries in the form of method, technologies, will, morale, organization, and patience (or time)[14]—all of which shape the intrinsic nature of asymmetry in warfare, the effectiveness of which must be carefully considered in military strategies and planning.

2.2.1 Asymmetry of Method

"An asymmetry of method entails using different operational concepts or tactical doctrines than the enemy."[14] These differences may be informal or formal based on the opponent and may consist of the following:

1. Conventional Warfare Versus Unconventional Warfare* and Unrestricted Warfare – Qiao and Wang, reflecting on the fact that there has been a "relative reduction in military violence" and "an increase in political, economic and technological violence," submit that unrestricted warfare is a reality and has established the principles of "using all means, including armed force or non-armed force, military and non-military, and lethal and non-lethal means to compel the enemy to accept one's interests."[15]

At the other end of the spectrum is conventional warfare, which adheres to forms of warfare deemed acceptable by laws, treaties, protocols, and conventions. The asymmetry becomes the differences between adversarial powers acceptance and interpretation of various treaties and protocols as applied to the justification and conduct of armed conflict or to arms control.[6]

2. Attack Against Traditional Military Centers of Gravity Versus Attacks Against Nontraditional Military, Political, and Societal Targets – The lack of constraints leads to an approach that everything is "fair game" as a target. For example, the attacks may be physical against military bases in the continental United States, political leaders, financial markets, or energy grids. The attacks may also be nonphysical, such as "psychological war aimed at soldiers' families,"[15] smear campaigns against politicians and political coalitions, or economic attacks.

Correspondingly, Barnett notes: "Target selection is a two-way street. Adversaries will be conducting their own targeting as well and will be aware of one's targeting effort. This means that they will seek to prevent targeting of their key or vital nodes, while attempting to identify and target those of their attacker. They will also seek to take asymmetrical advantage of their enemy's perceived targeting proclivities and restraints."[6]

3. Use of Traditional Military Weapons Versus Nontraditional Weapons – In his book on fleet tactics, Naval warfare researcher Wayne Hughes develops the tactical implication of using unconventional or unrestricted ways and means in warfare: "The root of effective tactical action is an appreciation that force estimation is a two-sided business and that not all elements of force are found in the orders of battle."[16] There are numerous examples of notorious, nontraditional weapons being used to "influence the battlespace"—airliners used on September 11, 2001, the Trojan Horse, *Kamikaze* pilots of World War II, cyber network attacks, and mischievous financial market manipulation. Note that many nontraditional weapons exploit the civilian infrastructure to achieve desired effects.

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* In reference 12, unconventional warfare is defined as "A broad spectrum of military and paramilitary operations, normally of long duration, predominantly conducted through, with, or by indigenous or surrogate forces who are organized, trained, equipped, supported, and directed in varying degrees by an external source. It includes, but is not limited to, guerrilla warfare, subversion, sabotage, intelligence activities, and unconventional assisted recovery."

A key characteristic of those examples of nontraditional methods is the resultant surprise in how the adversary executes attacks against vulnerabilities. Surprise and attacking vulnerabilities are basic to conducting warfare; in and of themselves, they do not constitute an asymmetry, but radical asymmetry is evident when the nature of the attack greatly differs from warfighting conventions. Surprise multiplies the impact of the unconventional method.

2.2.2 Asymmetry of Technology

Asymmetries of technology are the differences in the sophistication and/or scale of technological capabilities employed for effect by the opponents. The difference may be based on availability and efficacy of the technology or on the desired effect (physical versus psychological). Weak power adversaries show an increasing ability to respond to superior technological capability with innovative, fast, low-cost, and regional-specific technology applications that exploit proliferation of commercial and military technology markets. Contrasting different approaches of technology exploitation reveals the warfare enabler effect of technology asymmetry. Examples of these differences are shown in table 1.

Table 1. Contrasting Approaches to Technology Exploitation

Superior Force	Inferior Force
Limit technology purchase to in-nation markets to protect jobs	Shopping and pilfering in the global technology marketplace
Emphasis on new exotic technologies from long timeline, disconnected innovation activities	Rapid integrative innovation using current technologies in new ways
Bureaucratic stove-piping of research and development, prototyping, test and evaluation, experimentation, and training	Experimentation, basic operations, and enhanced operations that are combined into one continuous, coherent effort
Emphasis on and international expectation for weapons precision and no collateral damage (for example, cruise missile, smart bomb)	Indiscriminate weapons with disregard or desire for collateral damage (improvised explosive devices (IEDs); nuclear, biological, and chemical (NBC)/electromagnetic pulse (EMP) weapons)
Centrally controlled information for hierarchal planning and response	Distributed and adaptively coordinated use of information for attack (for example, denial of service); commander's intent is initially known and evolves through time even without the commander
Emphasis on robotic autonomy to reduce risk to humans and increase persistence (for example, the Predator unmanned air vehicle)	Human/recruit intensive execution of dirty/dumb/dangerous mission (for example, suicide bomber)

2.2.3 Asymmetry of Will

Asymmetries of will are the differences in the motivation and determination to succeed. The motivation to survive or protect vital interests is always more powerful than the motivation to influence or protect nonvital interests, the result of which is a national and personal resolve based on trading off (1) the willingness to accept losses versus being risk averse and (2) the "willingness to suffer costs"[17] versus a refusal to expend resources. A good measure of willingness to suffer costs is when national "guns or butter" investment decisions favor "guns."[3]

Carl von Clausewitz wrote, "If you want to overcome your enemy you must match your effort against his power of resistance, which can be expressed as the product of two inseparable factors, viz., *the total means at his disposal* and *the strength of his will*."[18] This principle is further evolved by Edward A. Smith, who contrasts the asymmetry of will with an asymmetry of means, which differentiates the motivation and determination to succeed from the capability and capacity of resources necessary to succeed. In a tactical attrition-based campaign, the will of each side may be equally strong, resulting in success favoring the side with superior means. In an era of limited warfare, where attrition is not the measure of success, it is conceivable that the side with inferior means will be successful even though the will on each side is equally strong.[19]

Asymmetry of will is considered by many to be the greatest asymmetric disadvantage of Western powers for conflict entailing the perception of vague vital or nonvital interests and, therefore, unclear strategic objectives. As an example of this perspective, General Rupert Smith writes that the objective of conflict has changed in that "We do not intervene in order to take and hold territory; in fact, once an intervention has occurred a main preoccupation is how to leave the territory rather than keep it. Instead, we intervene in, or even decide to escalate to, a conflict in order to establish a condition in which the political objective can be achieved by other means and in other ways [than military]."[20] Because the conflicts do not lend themselves to quick military victories, the engagements can be very costly in resources; trained volunteer forces and modern materiel are "too scarce and expensive to waste."[20] These factors lead to "one of the endemic problems of our modern conflict [being]… the lack of political will to employ force rather than deploy force—meaning will is close to zero."[20]

This perspective on the asymmetry of will can yield controversy in public discourse, but it is worth noting that just the perception of lack of resolve on either side sets the stage for asymmetric conflict with will as a basis.

2.2.4 Asymmetry of Morale

Closely related to the asymmetry of will are the differences in morale—enthusiasm and dedication to the cause. The morale may be that of armed forces or of the citizenry. The morale of the armed forces may be high on both sides, but if the morale of the citizenry is low, it may lead to a political defeat and may even spread to the armed forces.

Will and morale are closely related to the belief system of the opponent and, thus, can be viewed as an associative asymmetry of morals: a difference in the perception of what is right

and acceptable behavior. The strength of the will can be such that certain circumstances "justify" compromising moral behavior standards of the armed force or citizenry. An example is the retaliatory mindset associated with the Allied bombing of Dresden and other German cities with resultant high civilian losses versus the public outcry over U.S. bombardment of civilian Vietnamese locales.[3] In an era where warfare crosses military, political, and societal lines, there are inevitable asymmetries associated with that deemed legal versus illegal by international standards (laws, protocols, and treaties) and national laws,[21] civilized versus barbaric behaviors, and military versus civilian targets.

2.2.5 Asymmetry of Organization

Asymmetries of organization are the differences in the nature and construct of opposing armed forces and, from a conventional campaign perspective, are the differences in the nature and constraints of opposing governments and societies. As an example of the latter, Barnett discusses the impact of U.S. organizational constraints on strategy, tactics, and timelines based on the openness of its society, political control of the military, and Allied and United Nations wishes and proclivities.[6] Barnett argues that although these constraints are not all bad, it must be recognized that "they do constitute another breeding ground for asymmetrical actions,"[6] which must be accounted for in the strategy and planning processes.

The former organizational difference may simply be regular versus irregular armed forces, where the latter are "armed individuals or groups who are not members of the regular forces, police, or other internal security forces."[12] It may be regular force versus regular force where each side is employing different fighting formations.[13] In modern terms, it may be state-sponsored, highly-networked, tangible forces versus nonstate-sponsored, loosely-networked, intangible forces. For conventional campaigns, it may be state-sponsored, highly-networked, tangible forces versus state-sponsored, loosely-networked, intangible forces—a situation that becomes more gravely interesting if the adversary is a nuclear-weapon state.

2.2.6 Asymmetry of Patience (or Time)

Asymmetry of patience is the difference in the time scale considered acceptable for achieving success. The acceptable time scale may take the form of a quick military response with desired political effect or a protracted engagement allowing nonmilitary options the time to succeed. Steven J. Lambakis offers that the latter "may achieve victory by merely stalling military operations, politically dividing alliances and coalitions, or humiliating the Armed Forces,"[21] demonstrating the evident linkage with strategic objectives. The differences in perspective may be based on one's military weakness (for example, the Colonists in the American War of Independence) or on cultural norms, and they can be closely linked with asymmetry of will. As an example, Metz writes, "Americans are instinctively impatient, seeking fast resolution of any problem." This attitude can be contrasted with Asian or South American cultures, where patience and willingness to prevail in a conflict can stretch for years or decades.[13]

2.2.7 Asymmetry of Warfare Summary

When taken in total, all the forms of asymmetry in warfare can be extremely synergistic and the power of the synergy is maximized by an adversary who is innovative, adaptive, and resilient in exploiting these asymmetries. History has shown that an adaptive and innovative inferior armed force that exploits a superior armed force's asymmetrical weaknesses generally prevails. This result is based on the inferior armed force use of nontraditional methods and indirect strategies to achieve strategic political objectives versus the superior armed force use of traditional military methods and direct military strategies to achieve strategic military objectives. The research of Arreguín-Toft[4] and the strategic writings of B. H. Liddell Hart on indirect strategies[22] and Edward Luttwak on the paradoxical logic of strategy[23] lead to an understanding that the superior power must adaptively employ nontraditional methods and indirect strategies against the adversary's asymmetrical weaknesses to prevail. In so doing, the conflict shifts to a symmetrical basis where equally adaptive and innovative combatants are in competition for a new asymmetrical advantage. If the conflict is approached properly, the depth of the superior power is asymmetrical strengths (resources, readiness, coalition, etc.) should prevail.

2.3 HISTORIC EXAMPLES OF ASYMMETRY IN MARITIME OPERATIONS

Most of the military conflict asymmetry examples found in defense literature are based on land operations. The following historical maritime asymmetric examples highlight the many implicit strategies that can be used to exploit particular asymmetries.

1. Colonial Privateers – The Continental Congress authorized private citizens by letters of marque to attack British shipping during the American War of Independence. This action was asymmetry of organization (irregular versus regular armed forces).

2. Q-Ships – During World War I, the British employed ships disguised as merchant ships to attack German U-boats. This action was asymmetry of method and technology.

3. Blockade of Zeebrugge and Ostend – During World War I, the British attempted to deny over 30 German U-boats the use of the navy base at Bruges by bringing in and sinking five block-ships at the Zeebrugge and Ostend canal openings.[24, 25] This action was asymmetry of method.

4. High-Speed Boats, Frogmen, and Minisubmarines – During World War II, the vastly outnumbered Italian Navy established an organizational command that utilized these capabilities in low-intensity strikes against British and French fleets.[25] This was asymmetry of method, technology, and organization.

5. PT Boats – The U. S. Navy employed high-speed motor torpedo boats combined with night time attack tactics to counter the capabilities of larger Japanese Imperial Navy warships. This action was asymmetry of method and technology.

2.4 ANTI-ACCESS/AREA-DENIAL (A2/AD) STRATEGIES

A U.S. national defense strategic objective is to "promote the security, prosperity and freedom of action of the United States and its partners by securing access to key regions, lines of communications, and the global commons."[26] This strategic objective necessitates the operational capability to "operate in and from the commons by overcoming challenges to our global maritime, air, space and cyberspace operations," necessitating a key operational capability to "project and sustain our forces in distant anti-access environments."[26]

Understanding the military power projection imperative fostered by the U.S. National Defense Strategy, potential adversaries require effective A2/AD strategies. The desired objective of an A2/AD strategy is to *prevent* the opposition from gaining and sustaining access to a particular region of the battlespace.* If proponent forces are inferior, acceptable objectives may be to *slow* or *deter* the opponents from gaining access, or perhaps to make the access transient by causing a high cost-to-benefit for the opposition. A disruption of opposition force flow may be sufficient for the proponent's military and political objectives to be met. Any disproportionate loss of the opponent's military, political, or societal targets may be sufficient to deter continued opposition engagement. The proponent must carefully balance any effects to avoid intensifying the opposition's will and patience.

The following paragraphs explore the relationship and implications of inferior force A2/AD strategic elements (section 2.4.1) and superior force access strategic elements (section 2.4.2) in the context of asymmetry in warfare (see figure 1).

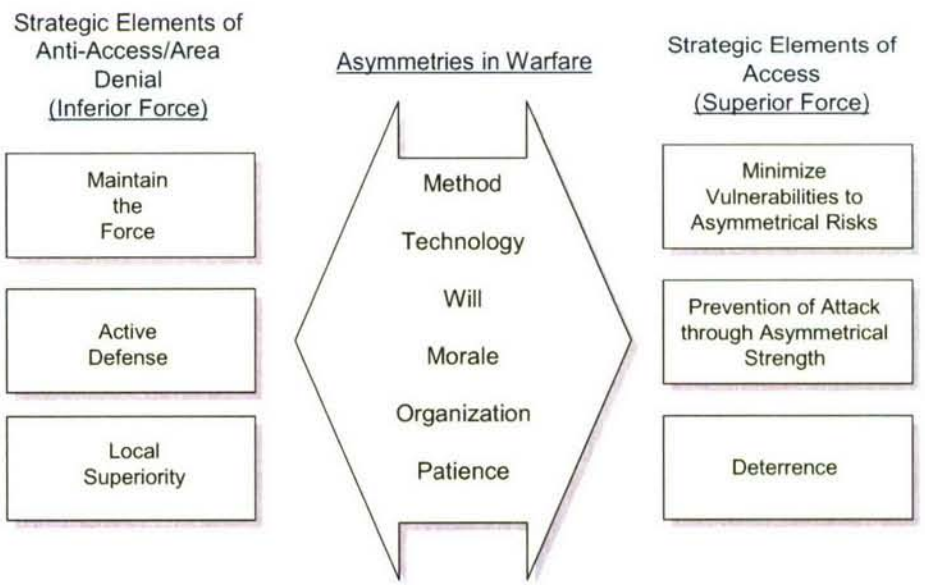

Figure 1. Asymmetry in Warfare, A2/AD and Access Strategic Elements

* This discussion focuses on only the spatial dimensions of the battlespace; other dimensions, such as cyberspace and psychological/cognitive space are also involved.

2.4.1 Strategic Elements for Inferior Armed Forces

Often dramatic differences between superior and inferior armed force capabilities are viewed as asymmetry based on traditional military measures. General Smith writes, "We tend to measure potential military force by counting the men, ships, tanks and aircraft of all sides and we compare one inventory with another, measuring the balance of power accordingly. ...but comparing inventories can lead to dangerously simplistic judgments at the outset." He goes on to offer that "[t]he power of a military force is composed of three factors: the means—both men and matériel; the way they are used—doctrine, organization and purpose; and the will that sustains them in adversity."[20]

Along these lines, a useful expansion of the distinction between the superior and inferior forces is provided by Shen:

> What we mean by superiority is the advantageous position in military strength and combat posture. It is composed of superior political conditions, powerful military forces, abundant material base, full war preparations, correct operational direction, advantageous natural conditions, favorable mass opinion, and international support, among which some factors occupy a dominant position. Inferiority refers to the disadvantageous position in military strength and combat posture. It contains political backwardness, weak military strength, insecure economic base, insufficient war preparations, poor leadership, disadvantageous natural conditions, unfavorable mass opinion and lack of international support, some of which play a leading role.[27]

Thus, based on the previous discussion whereby asymmetry in warfare can take many forms, a broad perspective on what constitutes superior and inferior armed force capability is required.

The U.S. military force is typically differentiated as being superior to any other nation's armed force in the world. Consequently, virtually any U.S. adversary is compelled to develop, to some degree, strategies utilizing asymmetric principles to achieve its objectives. As such, inferior forces must utilize the strategic elements described in paragraphs 2.4.1.1 through 2.4.1.3.

2.4.1.1 Maintain the Force. The number one military strategic element is to ensure that an armed force exists to continue the struggle. The inferior power has an imperative for taking calculated risks in engaging the superior opponent on terms that avoid any climactic battle with the potential to significantly attrite capability. Any interaction would also be carefully weighed so as to prevent an escalation of the superior opponent's capabilities. A most likely strategy entails protracted, episodic engagements in order to wear down the superior opponent's will, patience, and ability to sustain the conflict.

The strategic element of maintaining a force is documented in numerous publications. For example, Hughes[16] talks about the requirement "to maintain a fleet in being," as does Sir Julian S. Corbett:

> The doctrine of the "Fleet in being" as formulated and practiced by Torrington and developed by Kempenflet goes no further than this, that where the enemy regards the general command of a sea area as necessary to his offensive purposes, you may be able to prevent his gaining such command by using your fleet defensively, refusing what Nelson called a regular battle, and seizing every opportunity for a counterstroke.[28]

Similarly, Mao states:

> The military objective is simply to preserve oneself and to annihilate the enemy. To annihilate the enemy means to disarm him or to deprive him of his power of resistance, and not to annihilate him completely in the physical sense.[2]

2.4.1.2 Active Defense. Active defense is the "employment of limited offensive action and counterattacks to deny a contested area or position to the enemy."[12] Jonathan F. Solomon, reflecting on the tactical writings of Vice Admiral Stepan Osipovich Makarov, elaborates:

> ...the tactics and goals of effective access-denial forces have changed little over the last century. They remain based in active defense doctrine, seeking quick hit-and-run strikes that steal the initiative from their adversary, weaken his resolve, and degrade his projection of power ashore. They strongly believe [their] defeat is probable if they permit their adversary to maintain the initiative uncontested.[29]

Deception, concealment, maneuver, and dispersal of forces are ways of waging active defense while appearing ubiquitous and intangible.[22] Active defense can be found as the explicit doctrine of nations. For example, the Office of Naval Intelligence writes of China's People's Liberation Army (PLA):

> The current operational component of the "National Military Strategic Guidelines for the New Period" is known as "Active Defense" ... as adjusted for the conduct of "Local Wars Under Modern High-Tech Conditions." "Active Defense," therefore, is the highest level of strategic guidance for all PLA military operations during war and preparation for war during peacetime.[30]

2.4.1.3 Local Superiority. The inferior armed force will strive to establish local control of changing locales versus total command of the area. Continuous weakening of the opposition is more important than is defending a particular locale—a passive defense. This objective is accomplished through an adaptive exploitation of opponent vulnerabilities identified by an extensive network of reliable, time-sensitive intelligence sources, thus providing superior and reliable local knowledge.[22] The network relies on physical and informational support of noncombatants (knowing or otherwise)* and must be carefully nurtured to preclude compromise by any activities that adversely affect noncombatant patience or morals.

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* For example, "...one should rely on the broad masses of people and progressive forces in the coastal regions and bring into play their roles in carrying out reconnaissance, mine laying, harassment, and logistic support ..." (a translation of Wang and Zhang provided by Cliff et al.[31]

2.4.2 Superior Armed Force Access Strategic Elements

Being a superior armed force is the desired posture in terms of available options, but it is important that access strategies that counter adversary A2/AD attempts be developed. Such a strategy entails direct attack on military targets and attacks on nontraditional targets that exploit asymmetrical weaknesses. The superior armed force must (1) mitigate losses caused by inevitable attacks on centers of gravity and high-value nontraditional targets and (2) apply continuous pressure from conventional and unconventional offensive actions against the opponent's nontraditional armed forces and centers of gravity to sustain the initiative.

Effective countering of A2/AD causes degradation of the opponent's asymmetry of will, morale, method, and time. The strategic elements that can be employed by superior armed forces are (1) minimizing vulnerabilities to asymmetric warfare, (2) prevention of successful attack through asymmetrical strength, and (3) deterrence.

2.4.2.1 Minimizing Vulnerabilities to Asymmetric Warfare. In unrestricted warfare where all is deemed fair in war, risk reduction begins with an assessment of traditional military centers of gravity and high value nonmilitary target vulnerabilities to asymmetrical attack. General Montgomery C. Meigs frames the vulnerability problem and self-assessment approach as follows:

> The nexus of the problem involves divining and pre-empting the creativity of an unconventional opponent and his ability to reform and reorganize in an effort to create new structures for command and control and new attack mechanisms exploiting idiosyncratic approaches to his target. This problem exists for the operational and logistical structures we deploy to conduct campaigns as well as for systemic targets in our national civil structure and those of our allies.
>
> . . . These threats to our national systems apply as well to the structural elements that make up military forces in the field. We must ask ourselves where our interdependent, highly integrated, and technologically intensive systems are most at risk. How are logistics and communications most susceptible to manipulation in a way that could produce catastrophic effects? Where are our forces most vulnerable – in transit, in staging, in onward movement? In both the national infrastructure and in the military infrastructure in the field, what are the vulnerabilities where an eccentric attack could begin a process of accelerating destruction? How do we protect those vulnerable points?[32]

The challenge is to apply "out-of-the-box" thinking to vulnerability assessments, which suggests that innovation is integral to success. In addition to vulnerability assessments and resultant actions, there are other universal, proactive steps that can be taken to minimize vulnerabilities to the inevitable asymmetrical attack:

1. Distribution of military centers of gravity and high-value nonmilitary targets to complicate targeting by the opponent.

2. Use of expendable capabilities and devices in place of high-value units to alter the risk, and thus cost-to-benefit ratio, of key adversary actions.

3. Concealment to reduce risk to assets and missions, promote surprise, and increase adversary uncertainty.

All three steps require the proper tradeoff analysis to determine the acceptable level of risk. One can argue that the emerging distributed military force capabilities associated with network centric warfare over the last decade are meant to align with the above risk management approaches.[19, 33, 34]

2.4.2.2 Prevention of Successful Attack Through Asymmetrical Strength. History has shown many instances where weak powers have undertaken military action knowing their military losses may be high but their political objectives have a high probability of success.[7] Inevitable attacks will occur even though steps are taken to minimize vulnerabilities. It is important to prevent successful attacks when they occur by building upon the strong power's asymmetrical strengths in breadth and depth. As indicated by Shen,[27] this strategy takes many forms, such as superior positioning of international and national support, military force strength, readiness, and combat posture. Strategic planning must continuously assess which of these are the most important against particular potential adversaries.

Counter A2/AD research suggests that intelligence is the greatest strength—following the adage "knowledge is power." Because many attacks will not be regular, it is imperative that intelligence networks be established so that the superior armed forces can be as prepared as possible for the nature of the attacks. An important subtlety is the need for continuous learning about the potential adversary's asymmetries and causes, including the totality of a potential adversary's writings and not just his writings on the military.

Intelligence is never complete and sufficient, so it is important to deny sanctuaries for the inferior armed forces. The focus of this discourse is on conventional campaigns; therefore, in many cases, the sanctuary will be in sovereign territory or territorial waters. There has been a recent trend to locate sanctuaries in proximity to civilian, historic, or cultural centers. These factors present interesting policy issues and rules-of-engagement constraints if the desire is to prevent the adversary a sanctuary prior to any armed conflict. Because the means used by an adversary may be nontraditional, intelligence sources may need to look for nontraditional sanctuaries. Diplomatic and economic means may be necessary to prevent sanctuaries from being established within sovereign territories or adversary allies. Another means of denying sanctuary is to force the adversary to continuously move, which requires a force in numbers sufficient to pressure the adversary across the battlefield.

Because there will always be surprises, the last preventive strength is focused on the last line of defense—early warning, interception, and point defense of military centers of gravity and high-value nonmilitary targets against asymmetric attack. This strategy was used against the *kamikaze* pilots in World War II[35] and is now used to thwart suicide bombers in the Middle East.

2.4.2.3 Deterrence. Strategic deterrence during the Cold War was well understood. Both superpowers possessed significant military might and clearly articulated the intent to use this power in retaliation against any first strike. Arguably, the fear of mutual assured destruction kept total war between the superpowers in check.

Deterrence differs for conventional campaigns with limited objectives.* An adversary may be willing to lose the military battle, so the threat of retaliation may not contribute to deterrence. In addition, possessing a superior armed force is desirable but not sufficient if a weaker power believes that the retaliation will be measured—that is, limited by national constraints or by the court of world opinion—or if the weaker power's first strike is viewed as being sufficient to achieve their objectives.

Another form of conventional deterrence is deterrence by denial, which has been defined as "convincing an opponent that he will not attain his goals on the battlefield."[36] This definition is limited if obtaining goals is defined as the littoral military battlefield and not the broader diplomatic, economic, and military battlefield.[7] Barnett offers a broader definition for deterrence by denial as that which would "prevent any action on the part of the perpetrator from succeeding."[6]

Conventional deterrence by denial is based on preemptive or reactive military, diplomatic, or economic attack against an adversary. It is important to develop within the weaker power a perspective that achievement of disproportionate superior force loss and thus achievement of the limited objectives is not possible. Planning must build on asymmetrical strengths and must determine what will deter the adversary if the threat of death and destruction will not.

2.5 SUMMARY OF THE PRINCIPLES OF ASYMMETRIC WARFARE

This examination of asymmetric warfare reveals significant challenges to any strategists and planners. Lambakis cautions: "Asymmetry's loose definition may lead to distinctions that are logical but that, on clear examination, appear rather foolish."[21] If care is not taken, the actual value of the asymmetric discussion of military strategy and planning can be lost.

U.S. power projection strategy will likely mean actions requiring access to venues defended by inferior armed forces. It is essential to understand asymmetry, in the context of conventional to unrestricted warfare, and what it means at strategic, operational, and tactical levels.

Sun Tzu[37] and Clausewitz[18] promote understanding of the adversary as a tenet of warfare. This understanding goes beyond an adversary's military power; or, as John Boyd has written, it is an understanding that is sufficient to penetrate and overwhelm the "adversary's moral-mental-physical being."[38] It involves understanding how asymmetry enables inferior armed force A2/AD strategies and understanding that plausible access and deterrence strategies are critical to

* If both antagonists in the conventional campaign are nuclear-armed states, the overarching calculus of strategic deterrence will still apply, ideally keeping the conflict from escalating to nuclear conflict.

U.S. preparedness. Because asymmetric ways and means are so different from the 20th century conventional warfare mindset, special care is needed to apply a high level of clinical objectivity to strategy, tactics, and operational capability options. The options that allow the ability to rapidly and smoothly shape and adapt to emerging confrontations and conflicts may mitigate the adversary's asymmetrical advantage.[38]

The future of the United States depends on its ability to adapt to emerging confrontations and conflicts. It is incumbent upon the defense planning community to examine its mindset and, if necessary, make the necessary changes to adequately prepare for a maritime asymmetric adversary.

3. IMPLICATIONS OF ASYMMETRY FOR UNDERSEA WARFARE

Some have suggested that, as activities on the surface of the earth become more observable by pervasive sensors and as it becomes increasingly easy to strike any site on the surface of the earth with a weapon, the undersea domain will by necessity be increasingly exploited for competitive advantage.[23, 6] Although most existing examples of asymmetry involve land-based events, maritime events have also shown that the principles of asymmetry apply to at-sea combat. This section explores how the principles of asymmetry might be applied in the undersea domain against maritime forces that, by traditional military measures, are considered superior.

3.1 CONVENTIONAL CAMPAIGN/LIMITED WARFARE

The 2006 Quadrennial Defense Review[5] states that conventional campaigns are one of three areas that constitute national security needs. Various writings suggest that plausible future conventional campaigns will most likely entail limited warfare in the sense that:

1. The survival of either side is not at stake.[3]

2. The objective of the conflict may have nothing to do with occupying territory but may be based on establishing conditions for political settlement of the confrontation.

3. The adversary may be a nuclear-weapon state and the United States does not want escalation to the brink of nuclear power use.

4. The United States does not want to cause (but may accept) massive casualties among an adversary's civilian population nor does it want to needlessly destroy or damage the country's infrastructure or environment, thus minimizing any cost of reconstruction in terms of lives, time, and money.[6]

5. The United States wants to minimize any world community perception of U.S. hegemony and imperialistic expansion.

There could also be an asymmetry whereby a conflict could be "limited" for the United States in the extent of capability, resources, and political will expended but could be "total" for the adversary[3] (for example, Kosovo, Desert Storm).

A review of the principles discussed in section 2 shows that there are a number of asymmetric A2/AD approaches, originating from under the sea, that could be envisioned as plausible for the adversary:

1. In an attempt to disrupt the flow of antisubmarine warfare (ASW) assets and thus increase risk to superior expeditionary forces, the adversary could unexpectedly surface an out-of-area submarine around a U.S. forward base, an allied coast, or the continental United States. A strategic pause could be created while the adversary's intent was being assessed.

2. In an attempt to deter superior armed force involvement in a conflict, dependent on the perspective of U.S. resolve, an adversary's out-of-area submarine could launch a pre-emptive strike on a U.S. forward base, exploiting potentially lesser defended targets and creating disproportionate loss of life.[39]

3. In another attempt to divert and dilute superior armed forces, the weaker power could arrange for sympathetic "saber-rattling," including movement of undersea forces of its allies.

4. To weaken the United States and protract the conflict, a weaker power may decide to survive the first wave of U.S. response and use undersea capabilities to attack the (more vulnerable?) logistic flow resupplying "fuel and bullets."[40] Thus, submarines and submarine-launched mines might be used against more centers of gravity than warships and not just forward-deployed assets.[31]

5. A strategy might be to attempt prevention of U.S. armed force escalation through the use of nonlethal weapons from under the sea (for example, EMP weapons against U.S. war and logistics ships, anti-satellite weapons (destructive or jamming), and low-technology barriers and entanglement devices).

There are also lethal and nonlethal approaches to weaken the United States or to weaken or destroy U.S.-led coalition will before or during the conflict:

1. Strong power-allied cooperation may be dissuaded based on the presence off the ally's coast of an out-of-area submarine with unknown intent that (a) fires a missile ("accidental" or otherwise) that over-flies or intentionally strikes a target of little value or (b) conducts a preemptive strike on a U.S. base located within allied sovereignty.

2. In a calculated risk that national and international will is more concerned about economic stability than about a protracted engagement, the inferior armed force may cause a disruption of the flow of international commerce through the region by methods spanning harassment to sinking,* or through the use of undersea capabilities to blockade trade to the targeted country.[39]

3. Attacks could be waged on international sea bed information infrastructure through undersea severing or disablement of communications cables, with resultant impact on world markets.[8] This attack can be at either end of the cables, offering plausible deniability.

4. The inferior force could attack critical energy ports or terminals through blockage or destruction.[8]

These approaches could be applied and further assessed through an examination of hypothetical scenarios. One hypothetical scenario consists of a belligerent coastal country attempt to invade an adjoining or near country in which the United States has vital interest. Indications and warnings of the invasion have left the United States with little time to respond;

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* Cliff et al.[31] recommend that ". . . purely civilian vessels that put up resistance should either be captured [or] expelled. Third-country vessels should be ordered to leave and those that resist should be boarded."

that is, deploy the armed force necessary to halt the invasion. The belligerent strategy may be to slow the flow of maritime forces, thus delaying or minimizing U.S. access until a beachhead has been established. The success of a timely response may be based on the U.S. perception of the undersea threat, U.S. policy toward accepting damage or loss of warships and logistics ships, and U.S. rules of engagement.

A second hypothetical scenario relates to regional sea control. In this scenario, a potential adversary has an extensive coastline and strategic sea lines of communications (SLOCs) for the vital flow of resources and commerce. The adversary will have traditional coastal defense and SLOC protection roles. The coastal defense problem may be the A2/AD problem on a much larger scale. For example, the PLA has written that existing long–range strike weapons necessitate coastal defense being extended into the open ocean.[41]

Based on the above approaches, Fitzsimonds suggests that the weaker power can conceivably create a prolonged offense-defense imbalance or tactical instability[16] with its asymmetric approaches. This strategy might favor the hiding submarine if the ASW "finder" is concentrated in a layered ASW of high-value units. The side seeking to find the submarine must develop its own asymmetric approaches to circumvent the imbalance.[42]

3.2 ACCESS STRATEGIES TO COUNTER INFERIOR NAVY UNDERSEA A2/AD STRATEGIES

In section 2, three access strategy elements were introduced to counter inferior armed force A2/AD strategies: (1) minimizing vulnerabilities to asymmetric warfare, (2) prevention of successful attack through asymmetrical strength, and (3) deterrence. This section explores the application of these elements to the maritime A2/AD scenarios described in section 3.1.

3.2.1 Minimizing Vulnerabilities to Asymmetric Warfare

Access strategy elements for minimizing vulnerabilities are (1) assessment of vulnerabilities, (2) distribution of military centers of gravity and high-value non-military targets, (3) use of expendable capabilities, and (4) concealment of capabilities.

3.2.1.1 Assess Vulnerabilities. Brutally honest assessment of potential targeted vulnerabilities is required. Such an assessment typically cannot be accomplished without an external perspective. Metz and Johnson recommend the use of asymmetric war games where the Red Team is encouraged to win,[14] but the threat capabilities and intent should not be exaggerated. Fitzsimonds recommends that special attention must be paid to (1) what intelligence can discern about the adversary's doctrine and his options and (2) what an objective analysis of the adversary's warfare systems reveals as potential options with high probability of success if pursued.[42] Based on the maritime scenarios in section 3.1, table 2 provides examples of plausible adversary undersea-based asymmetric options requiring assessment.

Table 2. Asymmetric Vulnerability Assessment Examples

Asymmetric Option	Assessment Questions	Potential Blue Response Option
Deter complete flow of U.S. assets to a theater of interest by surfacing an out-of-area submarine off a U.S. forward base, an allied coast, or continental United States.	What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	Earlier movement of forces based on indications and warning or a different pre-positioning of forces.
Deter superior armed force involvement by an out-of-area submarine launch of a pre-emptive strike on a U.S. forward base.	What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Development of layered ASW capabilities and responses tied to forward bases and (2) development of capabilities that provide situational awareness of all adversary out-of-area submarine locations.
Divert or dilute complete U.S. assets flow to a theater of interest by sympathetic weaker power-allied "saber rattling."	What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Intelligence, surveillance, and reconnaissance of potential adversary ally's undersea capability to obtain situational awareness of location and intent, (2) containment away from the theater of interest, and (3) deterrence.
Weaken U.S. armed force and protract the conflict by impacting U.S. sustainment and dilution of ASW resources through undersea attack on U.S. logistics ships via an undersea rear flank.	Can logistics ships be protected from undersea threats or are all USW assets deployed far forward or in support of the warships? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Layered ASW capability and response tied to all elements of the sea base and (2) capability providing situational awareness of all adversary submarine locations and mine-laying activities.
Prevent U.S. armed force escalation through use of nonlethal weapons from under the sea.	What is the vulnerability of mission-critical equipment to undersea-deployed nonlethal weapons such as EMP, antisatellite weapons, low-technology barriers and entanglements? What is the impact if only the logistics ships are targeted? Are the impacts acceptable? What are the implications to ship system designs? Ship safety and self protection?	(1) Layered ASW capability and response tied to all elements of the Sea Base and (2) capability providing situational awareness of all adversary submarine and other potential delivery vehicle intent and locations.
Dissuade U.S. ally cooperation by out-of-area submarine missile launch over or into allied sovereign territory.	What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	In conjunction with allied forces, the development of (1) layered ASW capability and response associated with the allied territory and (2) capability providing situational awareness of all adversary submarine intent and locations.
Weaken U.S. or coalition will by undersea-initiated disruption of international commerce.	What are the maritime-based international commerce centers of gravity? What are the likely impacts of successful attacks on the different vulnerabilities? What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Layered USW capability and response tied to all critical international commerce centers of gravity and (2) capability providing situational awareness of all adversary submarine and other potential delivery vehicle intent and locations.
Weaken U.S. or coalition will by undersea-initiated attack on critical undersea international information infrastructure.	What are the maritime-based international information infrastructure high value targets? What are the likely impacts of successful attacks on the different vulnerabilities? What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Layered USW capability and response tied to all critical maritime-based international information infrastructure high-value targets and (2) capability providing situational awareness of all adversary submarine and other potential delivery vehicle intent and locations.
Weaken U.S. or coalition will by undersea-initiated attack on critical energy ports or terminals.	What are the maritime-based critical energy centers of gravity? What are the likely impacts of successful attacks on the different vulnerabilities? What would be the reaction and how would the flow of assets be affected? Are the impacts acceptable? What are the implications on needed operational capabilities? Numbers of assets? Location of assets? CONOPS?	(1) Layered USW capability and response tied to all critical energy ports and terminals and (2) capability providing situational awareness of all adversary submarine and other potential delivery vehicle intent and locations.

3.2.1.2 Distribution of Centers of Gravity and High-Value Nonmilitary Targets. Distributed force operation is a way of managing risk and handling the tactical instability that can be introduced by the asymmetric methods described above. Specifically, a strong power and its superior armed force can become risk-averse if its high-value assets are threatened indirectly by an inferior armed force. This risk aversion has three primary components stemming from the perception of whether or not the conflict is worthwhile:

1. human-loss dimension,

2. disproportionately large percentage of the armed forces' combat power represented by highly capable, multimission platforms (for example, CVNs, CG/DDGs, SSNs,) and,

3. replacement cost when even one such platform is lost.

Combined with sufficient armed force attributes of self-defense, covertness, persistence, and expendability, the use of distributed operations* enables risk reduction as a result of:

1. force dispersal, hiding, and greater standoff range engagements,

2. avoiding undesired force-on-force engagements,

3. surprise preemptive, retaliatory, containment attacks on the adversary from unpredictable sources,

4. more rapid, distributed employment decisions,

5. complicating the adversary's targeting and engagement chain, and

6. greater economy of force.[44]

These actions address distribution of military force centers of gravity via concept of operations (CONOPS) and type of military assets. There are unique operational and exploitation constraints that complicate the task of the undersea adversary. Moving U.S. operational force centers of gravity undersea can be beneficial. The physics that make undersea warfare (USW) challenging for the United States also complicates any opponent's ability to find and destroy undersea centers of gravity. This capability would come with a great investment and operational cost, but the cost should be consistent with the acceptable risk and objective of the conflict.

Forcing the opponent to perform A2/AD of a large area because of distributed centers of gravity necessitates the opponent's need to increase his operational capacity, change his CONOPS, or shift the target of his attacks. Thus, there are other centers of gravity, such as ashore forward bases, that must be considered vulnerable. Driven by cost and international politics, the numbers are few and the locations are limited, presenting the types of vulnerabilities

* For further information on the characteristics of distributed networked systems, see Cares et al.[43]

previously discussed. Distribution of these centers of gravity includes dispersion at sea along the lines of the U.S. Navy sea-basing concept.[45]

3.2.1.3 Use of Expendable Capabilities. The expendability of a capability (and therefore the expendability of the resources associated with fielding the capability) is proportional to the willingness to accept loss of that capability while achieving strategic and tactical objectives. For the last 100 years or so, as the most cost-efficient way to procure capability afloat during peacetime, the Navy procured small numbers of large, multimission platforms. When the United States went to war, however, the Navy had to establish emergency programs, especially for undersea warfare, to build large numbers of smaller, focused-mission platforms. For example, in World War I, the "splinter fleet" of 110-foot wooden boats was built with the purpose of exploding mines and conducting ASW.[46] In World War II, large numbers of destroyers were built, in part, because the primary objective in the Battle of the Atlantic was to protect the convoys and not protect warships or project power. Granted these examples were for a world war, but given current force levels, it is conceivable that the nature and timelines of future conflicts will not afford the luxury of building a reactive maritime force because "today neither time nor U.S. industrial capacity would permit anything approximating [the feats of the past].[47]

Vulnerability assessments should identify acceptable risk to loss of lives and operational force structure for plausible conflict scenarios. It is conceivable that more consideration should be given to the development of expendable maritime capability, where the risk and loss thresholds are exceeded. This capability may take the form of unmanned devices, unmanned vehicles, and inexpensive platforms with low manning levels. When expendable capability is being determined, consideration must be given to that which can be accomplished from a standoff position versus that which requires getting up close and personal (the maritime equivalent to "shock and awe" and "boots on the ground" phases). Strong technology asymmetry should allow the United States to maintain a lead in these types of capabilities—if she is not captured by an allegiance to legacy capabilities.

3.2.1.4 Concealment of Capabilities. Concealment offers the tactical advantage of surprise and risk mitigation. The limited objective conventional campaign offers an additional perspective on concealment. It is hard to conceal all elements of a superior armed force. For example, from a maritime perspective, which of the vessels in the egress approach, maneuver area, and sea base are friend, foe, or friendly to foe? Which will turn deadly, and which are providing reconnaissance information? Stealth technologies, low-probability of intercept techniques, and deception are initially effective but are transient in nature, thus requiring continuous evolution. Countries currently expanding undersea capabilities include China, India, and Iran partly because of the concealment offered by the environment. Serious consideration must be given to moving appropriate U.S. capabilities and centers of gravity undersea.

3.2.2 Prevention of Successful Attack Through Asymmetrical Strength

The superior armed force must maintain strength in traditional capabilities; it must also develop and maintain the resilient critical capability and capacity to prevent successful asymmetric attacks. Examples of these capabilities* are provided in the following paragraphs:

1. Focused Intelligence on Nontraditional Threats – [14, 32] The previous section highlighted plausible nontraditional undersea threats. Intelligence efforts should be focused on determining the potential adversary's willingness, intent, and capability to conduct such attacks during any conflict. It may also be necessary to develop nontraditional indicators of capability development or pending employment of the same. The development of the adversary's asymmetric ways and means will dynamically adapt to emerging U.S. military centers of gravity and high-value nonmilitary targets; thus, intelligence gathering is a continuous learning effort.

Nontraditional threats may be based on traditional or nontraditional weapons; intelligence efforts must, therefore, aggressively focus on old weapons used in new ways, as well as technologically feasible weapons. Because operation in the undersea environment is extremely difficult, evidence of practicing employment is, therefore, extremely important. This broadened sense of awareness should broaden the U.S. sense of preparedness.

2. Jam or Eliminate Opponent's Network of Noncombatant Observers and Reporters – Because the inferior armed force must rely on a network of observers and reporters for the information necessary to allocate its resources, degradation or elimination of this capability is paramount. This network entails people, sensors, and communications. Some maritime locales have large numbers of noncombatant shipping that may serve as an intentional or inadvertent source of information for the undersea threat. Diplomatic means, such as maritime exclusion zones, may be established to increase the uncertainty for the adversary. Based on the perceived threat, lethal or nonlethal means to jam or destroy the network may be necessary.

3. Friendly Network of Noncombatant Observers and Reporters – Planning should include how to hastily construct an *ad hoc* network of friendly observers and reporters. This plan may include being afloat with commercial shipping, fishers, or recreational vessels; it might include being ashore with coastal observers. Planning must address technologies and protocols, as well as any international policy considerations.

4. Early Warning, Interception, and Point Defense Against Undersea Asymmetric Threats to All High-Value Targets – This capability entails defense of warships and logistics ships from port to station, commercial shipping, forward land bases, bases in the continental United States, international undersea infrastructure, and energy ports and terminals. The defense is against submarines, mines, minisubmarines, unmanned vehicles and devices, underwater special operation forces, and all of their associated lethal and nonlethal weaponry. This last line of defense must be shaped in concert with any layered defenses and deal with the classic problem

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* Operational capability does not exist unless all aspects of DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel, facilities) are in place.

of whether to shoot the archer or shoot the arrow. This requires a comprehensive cost, benefit, and risk tradeoff analysis.

5. Disruption of Sanctuaries – The disruption of the sanctuaries associated with the undersea threat is challenging. For example, these sanctuaries may be located within sovereign territories or territorial waters or these sanctuaries may consist of traditional bases or facilities ashore. There may be at-sea sanctuaries associated with ocean bottoming, undersea hovering, or riding fronts and eddies, all of which complicate sensing and targeting. Many of these techniques are relatively static. These might be countered for manned platforms if sufficient force exists to pressure the adversary to move. The sanctuary may even be proximity to civilian shipping. Prior to conflict, there are constraints associated with any action in sovereign territories that may have to be addressed through the development of new policies, rules of engagement, or renegotiation of treaties. An operational capability may be meaningless if the mechanism and CONOPS do not exist to preempt an attack.

3.2.3 Deterrence

The ability to deter the inferior armed force (1) decreases as the will of the weaker power increases and (2) increases with the willingness of the superior power to use armed force. Conventional deterrence by retaliation operates on the principle of "use it and lose it or the repercussions will be greater than you want." If the will is strong, the adversary may decide that losing capability is an appropriate disproportionate exchange (for example, *kamikaze* pilots, where it is questionable whether the *kamikaze* attacks had any strategic military value but there is no doubt that they offered a serious psychological challenge for U.S. Naval officers and sailors). Deterrence under these conditions must be based on the deterrence-by-denial principle of "use it and lose it to no effect." Whether deterrence by retaliation or denial is the preferred method, each must be based on a demonstrated and publicized ability, capacity, and will to counter undersea threats (submarines, mines, surveillance networks, minisubmarines, unmanned undersea vehicles) in numbers. The U.S. access strategy must be based on adaptive and strong, redefined USW capabilities that address the potential vulnerabilities outlined in this report.

It should be noted that publicizing a deterrence capability must be strategically considered. There may be greater value in maintaining war reserve capabilities that prevent the adversary from having the ability to asymmetrically adapt to alternate methods or targets. One also must strategically consider how any deterrence capability might result in an arms race.

One final consideration is the need to deter the enabling of any undersea threat by the opponent's allies and friends. Diplomatic and economic means may be more successful, but the ultimate military means, if all else fails, must also exist.

4. CONCLUSIONS

Much of the recent national discussion about asymmetric warfare and asymmetric threats has not been based on rigorous understanding of the dimensions of asymmetry in warfare. Opponents in warfare are always looking for an asymmetric advantage against their adversary, so the term "asymmetric warfare" fails to have a useful meaning. It is especially important that strategists and planners consider all the elements of asymmetry that can be exploited and mitigated by both sides.

Asymmetry discussions have understandably been based on the War on Terror and U.S. homeland defense. From a national security perspective, it is equally important to address the asymmetric approaches that potential adversaries could employ during conventional campaigns that will most likely be of a limited-objective nature. Asymmetric conventional campaign conflicts with the United States are the inevitable outcome of limited-objective U.S. power projection. Interestingly, the application of asymmetric means and ways in conventional campaigns introduces hybrid combinations with war on terror/irregular warfare and homeland defense.

This report contributes to the sensibilities of asymmetry in a conventional campaign from a maritime perspective; more specifically, this report describes that which might constitute an asymmetric threat from under the sea. There appear to be many maritime-based asymmetric ways and means to forestall successful U.S. or U.S.-led coalition access while the adversary achieves its limited objectives. Continued dialog among naval and joint planners on this subject should better prepare the United States with response options.

Exploitation of the maritime undersea environment presents unique options for inferior armed force anti-access/area-denial capabilities, necessitating unique superior armed force access options. Military strategists and planners must further examine the risk that these asymmetries pose and examine the use of U.S. asymmetric strengths—beyond superior armed force (for example, unparalleled strength in undersea operations).

Current planning guidance calls for preparation of broad response options to deal with uncertain threats. It is unlikely that the United States will incur the financial and political costs to prepare against all plausible threat attacks. The maritime domain presents an equally daunting number of plausible threat challenges. National strategists and military planners must determine the risk of the maritime challenge relative to other plausible attack vectors. It is expected that, when the maritime challenge of limited-objective conventional campaigns is examined from an asymmetric and inferior force perspective, U.S. strategy, tactics, applied technology, and military investments will also need to be reexamined to reduce the uncertainty of the asymmetric threat and increase U.S. preparedness.

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